UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,049	02/26/2004	Kenzo Nonami	K-2152	3300

			EXAMINER
7590	07/25/2006		WEISKOPF, MARIE

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ART UNIT	PAPER NUMBER
3661	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/786,049	NONAMI ET AL.
	Examiner	**Art Unit**	
	Marie A. Weiskopf	3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>26 February 2004</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-26</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-26</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>26 February 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Specification

1.   Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3.   Claims 1, 14-19, 21-22, and 24-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- In regard to claims 1 and 26, the following terms are indefinite: "the current position" (line 3, claim 1; line 5, claim 26); "the attitude angle" (line 3, claim 1); "the altitude relative to the ground" (lines 3-4, claim 1); "the absolute azimuth" (line 4, claim 1); "the nose" (line 4, claim 1); "the servo motors" (line 6, claim 1; line 4, claim 26); "the ground station" (line 7, claim 1; line 7, claim 26); "the data collected" (line 9, claim 1). Each of these terms fails to have antecedent basis.

- In regard to claims 21 and 22, "a type 1 servo system" is indefinite and undefined. In claim 22, "any target value" is vague and indefinite.

- In regard to claim 22, "applying either...Gaussian theory or the linear quadratic..." is alternative and indefinite.

- In regard to claims 14-19 and 24-25, each place in the claims that refers to equations by number is improper and indefinite, since the equations are not clearly identified by number in the claims and, in many cases, multiple equations are referenced and some of these are not in the base claims of the referencing claim

Claim Rejections - 35 USC § 101

4.   35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 26 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 26 is directed towards a computer program. The MPEP states: "Both types of "descriptive material" are nonstatutory when claimed as descriptive material per se. Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759. When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized." See MPEP 2106.IV (B) (1) Claim 26 is directed towards a computer program and it not on any sort of computer-readable medium.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6.   Claims 1-5 and 13-26 are rejected under 35 U.S.C. 102(e) as being anticipated

by Yamane (US 2004/0075018).   This rejection is made by the best determination

possible in view of the numerous indefinite problems listed above. Yamane discloses

an unmanned helicopter, takeoff method of unmanned helicopter, and landing method

of an unmanned helicopter, comprising:

- In regard to claim 1, in a system that allows the autonomous control of a small

    unmanned helicopter, an autonomous control system for a small unmanned

    helicopter comprising:

    o Sensors that detect a current position, an attitude angle, an altitude

        relative to the ground, and an absolutely azimuth of a nose of the small

        unmanned helicopter (Page 3, paragraph 44)

    o A primary computational unit that calculates optimal control reference

        values for driving servo motors that move five rudders on the helicopter

        from target position or velocity values that are set by a ground station and

        the aforementioned current position and attitude angle of the small

        unmanned helicopter that are detected by the aforementioned sensors

        (Page 3, paragraph 44)

- A secondary computational unit that converts the data collected by the sensors and the computational results as numeric values that are output by the primary computational unit into pulse signals that can be accepted by servo motors (Page 3, paragraph 44)

- In regard to claim 2, wherein the sensors, the primary computational unit, and the secondary computational unit are assembled into a small frame box, thereby achieving both size and weight reductions that permit the mounting of the frame box on the small unmanned helicopter. (page 3, paragraph 44)

- In regard to claim 3, wherein the system has a ground station host computer that has the same functionality as the primary computational unit and wherein the autonomous control system can also use the ground station host computer as it performs the autonomous controls as necessary. (Page 3, paragraph 42)

- In regard to claim 4, wherein when using the ground station host computer as the primary computational unit for the performance of the autonomous controls, the autonomous control system outputs the computational results that are output by the ground station host computer to the servo motors through a manual operation transmitter. (Page 3, paragraph 42)

- In regard to claim 5, wherein when the ground station host computer is used as the primary computational unit for the performance of the autonomous controls, for the process of directing the computational results that are output from the ground station host computer to the servo motors through a manual operation transmitter, the autonomous control system is equipped with a pulse generator

that converts the computational results as numerical values into pulse signals

that the manual operation transmitter can accept (Page 3, paragraph 43)

- In regard to claim 13, wherein the primary computational unit calculates optimal

   control reference values for the driving of servo motors that operate the rudders

   for the small unmanned helicopter and the primary computational unit performs

   tri-axial attitude control for the small unmanned helicopter (Page 4, paragraph

   46)

- In regard to claims 14-19 and 24-25, the reference apparently fails to disclose the

   claimed equations, however, without any of the variables defined, it is impossible

   to determine this.

- In regard to claim 20, wherein the primary computational unit autonomously

   controls the small unmanned helicopter by executing independent autonomous

   control algorithms on six physical quantities of the small unmanned helicopter:

   pitch axis attitude angle, roll axis attitude angle, yaw axis attitude angle,

   longitudinal speed, lateral speed and vertical speed (Page 4, paragraphs 54-55)

- In regard to claim 21, wherein the primary computational unit autonomously

   controls the small unmanned helicopter by constituting the respective

   autonomous control algorithm as a type 1 servo system so that for the respective

   physical quantities of the small unmanned helicopter, the steady-state deviation

   from any target value will be zero. (Page 3, paragraph 45)

- In regard to claim 22, wherein the small unmanned helicopter is autonomously

   controlled by applying either linear quadratic Gaussian (LQG) theory or linear

quadratic integral (LQI) theory to the autonomous control algorithms that are

constituted as a type 1 servo system, by treating the respective autonomous

control algorithms as uncoupled transfer function representation mathematical

models.   (Page 4, paragraphs 54-55)

- In regard to claim 23, wherein the primary computational unit represents dynamic

   characteristics consisting of longitudinal speeds as mathematical models for

   which pitch axis attitude angles and roll axis attitude angles are input quantities,

   and by calculating the respective attitude angles that are necessary for effecting

   of arbitrary longitudinal and lateral speeds (Page 4, paragraphs 54-55)

- In regard to claim 26, an autonomous control program for a small unmanned

   helicopter, wherein the program causes the primary computational unit for the

   autonomous control system for the small unmanned helicopter to execute the

   following steps and causes it to compute optimal control reference values in

   order to drive servo motors for the small unmanned helicopter:

   o A step that receives detection signals from sensors that detect a current

      position, attitude angle, ground altitude, and absolute nose azimuth of the

      small unmanned helicopter (Page 3, paragraph 44)

   o A step that receives position or speed target values that are transmitted

      from a ground station (Page 3, paragraph 42)

   o A step that determines optimal control reference values for driving the

      servo motors that move a plurality of rudders for the small unmanned

      helicopter from the current position and attitude angle for the small

unmanned helicopter that are detected by the sensors (Page 3, paragraph

44)

o A step that causes translational motion control and tri-axis attitude control

on the small unmanned helicopter based upon the results of the

computational processing. (Page 3, paragraph 44)

Claim Rejections - 35 USC § 103

7.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

8.   Claims 6-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Yamane (US 2004/0075018) in view of Duggan et al (US 2005/00044723). Yamane is

discussed above and Duggan et al discloses a vehicle control system including related

methods and components. Yamane fails to disclose having a servo pulse

mixing/switching apparatus to allow switching of manual operation signals and control

signals that are output from the autonomous control system. Duggan et al discloses

being able to switch between various levels of manual and autonomous control for a

corresponding vehicle. Although the invention by Duggan et al is not for an unmanned

helicopter, it could easily be adapted to be used with any vehicle as necessary since the

control would just be from the ground station which is also present in Duggan et al to

send the autonomous controls. (Page 27, paragraph 375) It would have been obvious

to one having ordinary skill in the art at the time of the invention to use the switching

between various levels of manual and autonomous control in order as taught by Duggan et al with the invention of Yamane in order to be able to allow a user to manual control the unmanned helicopter when necessary for certain projects.
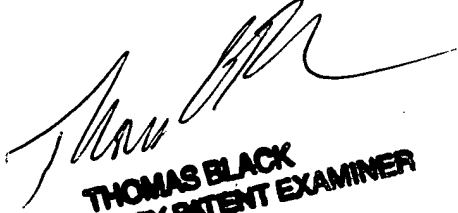
Conclusion

9.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 2002/0049518 to Yamamoto discloses a steering control device for radio-controlled model helicopter. Yamamoto discusses servo pulse mixing/switching.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marie A. Weiskopf whose telephone number is (571) 272-6288. The examiner can normally be reached on Monday-Thursday between 7:00 AM and 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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THOMAS BLACK
SUPERVISORY PATENT EXAMINER